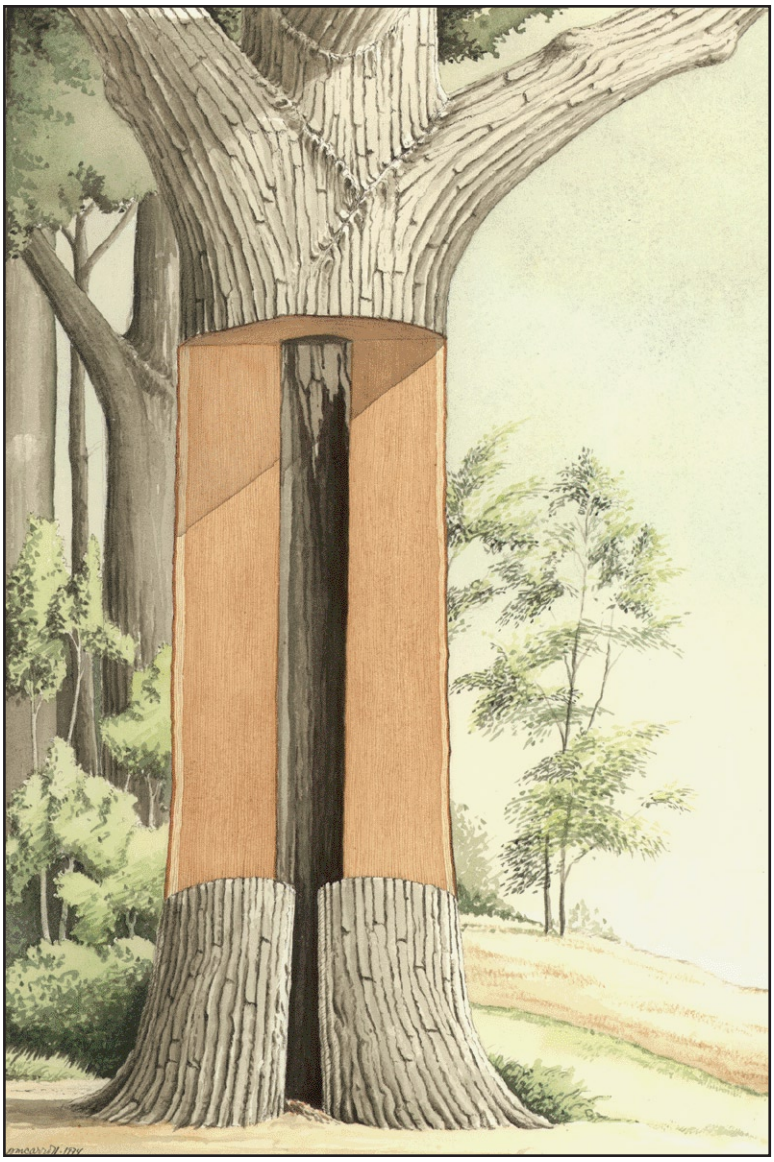

A First Look at Tree Decay

An Introduction to How Injury and Decay Affect Trees

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Original watercolors by David Carroll.

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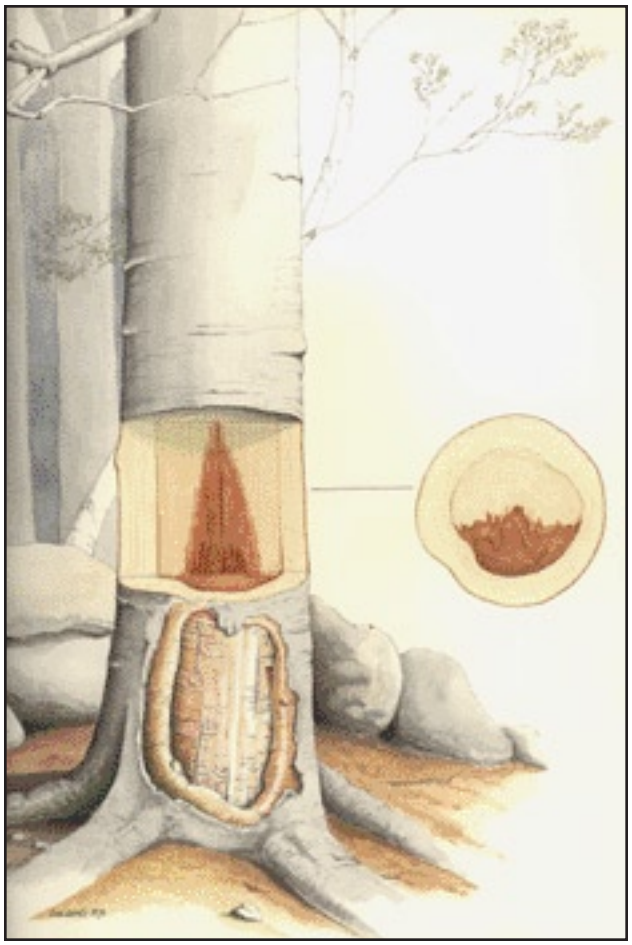
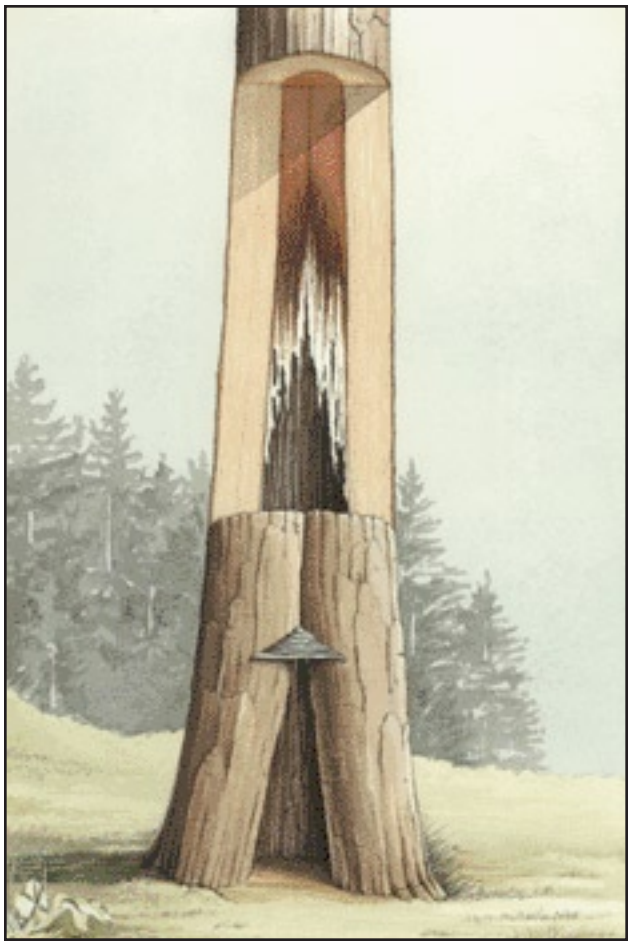
Photosynthesis and decay are the two most essential processes in nature.

Photosynthesis by green plants captures and stores energy from the sun. This energy is used to form wood and other tree parts. Photosynthesis also removes carbon dioxide and adds oxygen to the atmosphere.

Decay releases stored energy and essential elements by the breakdown of wood. Fungi decay the wood in living and dead trees as part of a vital web of microorganisms, insects, and wildlife. Decay organisms enter trees through wounds, large and small. Trees have survival strategies that can resist the spread of decay.



Wound at the base of paper birch



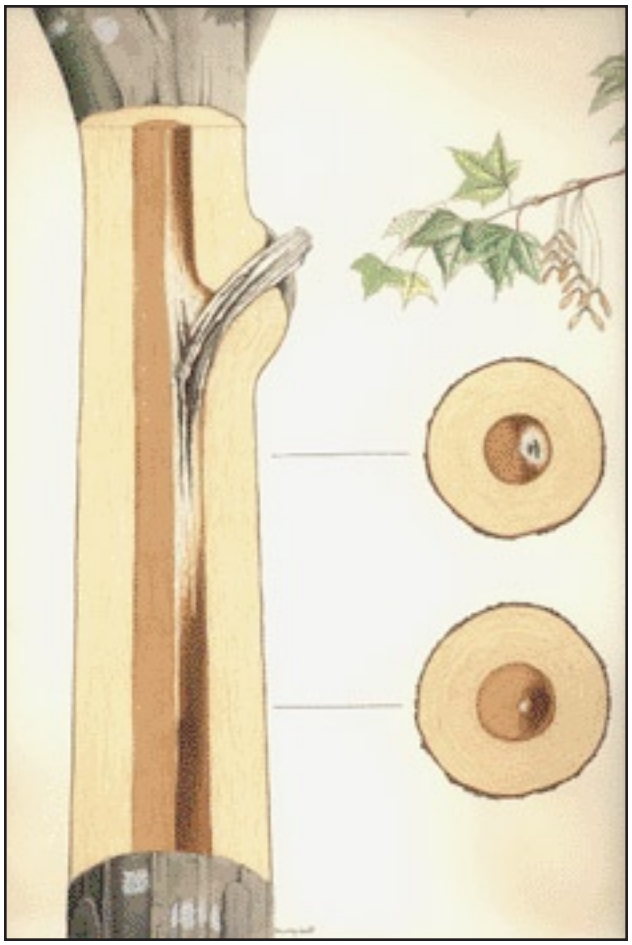
Wound at the base of white pine

Trees compartmentalize or "wall off" wounded areas. This process resists the spread of defect, infection, and decay and confines it to wood present at the time of wounding, thereby protecting future growth. The response to wounds causes chemical changes, some of which are visible as wood discolorations. Some discolorations are protective for the tree but "stain" and reduce the value of wood for lumber.

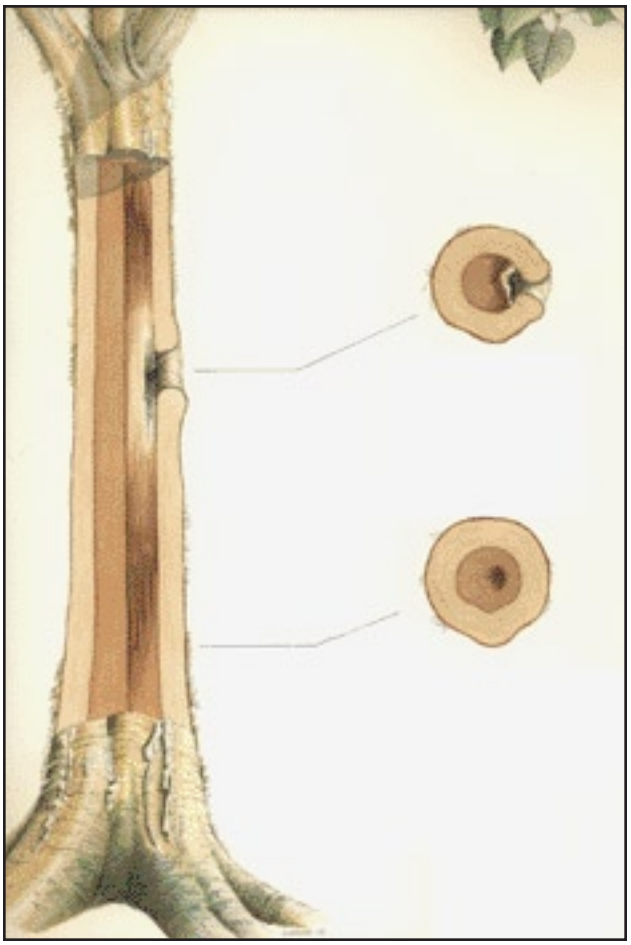
Large wounds at the base of the trunk cause the greatest injury to the tree and the greatest loss of timber value from stain and decay. Such wounds are infrequent in nature and are most often made by roadbuilding and logging.

When a branch breaks, decay organisms can infect the exposed wood. Decay moves slowly through the broken branch towards the main stem or trunk. Decay organisms are usually stopped from entering the trunk by chemicals formed in the base of the branch. Consequently the breakage of small branches, especially those high in the crown and distant from the stem, are not likely to be a major cause of discoloration and decay in the trunk.

Injury and decay are much worse when the stem that surrounds the branch base is wounded. This occurs when the bark below a branch is torn or when a branch is improperly pruned flush with the stem.



Branch stub in maple



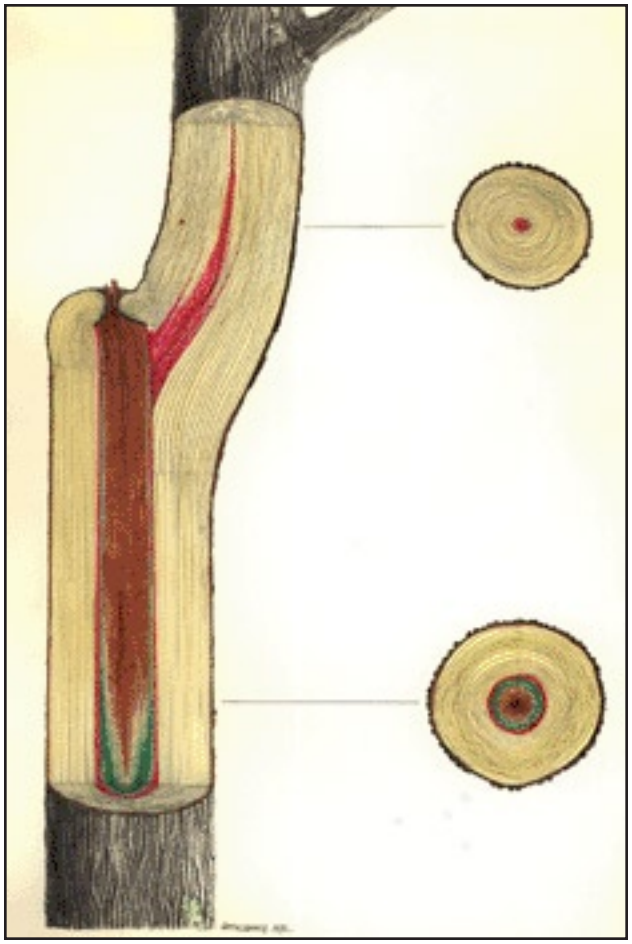
Stem scar of yellow birch

Stem scars can occur from impacts of falling trees during logging or storms. Infection begins where the stem is exposed and spreads vertically in the stem as the tree continues to grow in circumference.

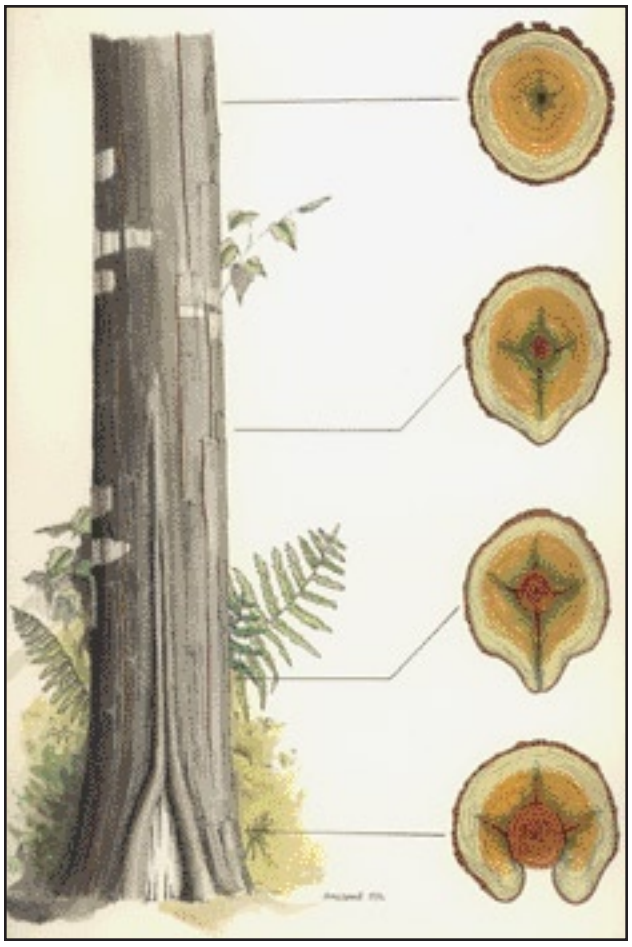
Early stages of infection result in discolored "wetwood." Wetwood dries poorly and can cause defects in wood products. Late stages of infection result in rotted wood. Rotted wood in living trees is separated from healthy wood by compartmentalization boundaries. Although the boundaries are highly effective, biological breakdown or physical injury can breach them and enable infection and decay to spread. Cavities produced from rotted wood can provide shelter for wildlife.

Unlike branch stubs, broken tops and split forks directly expose wood in tree trunks to infection. Discoloration will spread down the stem and tend to be limited to the diameter of the broken top. The rate of spread is variable, but in the Northeast is likely to be no more than 6 - 10 inches per year. A branch will form a new leader that is not likely to be infected from the broken top.

Storm injury that results in the natural breakage of small diameter tops may be unavoidable. Deliberate "topping" of stems should be avoided, especially for stems greater than 4 inches in diameter.



Broken top in red maple



Basal wound of red oak

Ribs of "woundwood" (sometimes called callus) have almost closed the exposed wound at the base of the trunk. The seam from the meeting of the woundwood ribs is mistakenly referred to as a "frost crack."

Although the tree survives, internal cracks or "spiderheart" reduce the value of the wood for products. These cracks can extend to the stem surface and may indicate a potentially hazardous tree.

Photosynthesis provides energy for growth and protection. Wood decay provides the energy for the spread of infections within the tree. Decay reduces the value of wood products and increases wildlife habitat and the cycling of essential elements.